



STN5PF20V

P-CHANNEL 20V - 0.065Ω - 5A SOT-223
2.5V-DRIVE STripFET™ II POWER MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STN5PF20V	20 V	< 0.080 Ω (@4.5V) < 0.10 Ω (@2.5V)	5 A

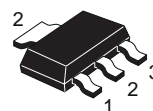
- TYPICAL R_{DS(on)} = 0.065Ω (@4.5V)
- TYPICAL R_{DS(on)} = 0.085Ω (@2.5V)
- ULTRA LOW THRESHOLD GATE DRIVE (2.5V)
- STANDARD OUTLINE FOR EASY AUTOMATED SURFACE MOUNT ASSEMBLY

DESCRIPTION

This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely extremely low on-resistance when driven at 2.5V.

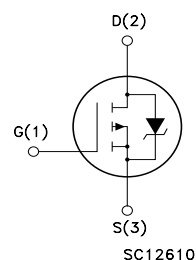
APPLICATIONS

- POWER MANAGEMENT IN CELLULAR PHONES
- DC-DC CONVERTERS
- BATTERY MANAGEMENT IN NOMADIC EQUIPMENT



SOT-223

INTERNAL SCHEMATIC DIAGRAM



ORDERING INFORMATION

SALES TYPE	MARKING	PACKAGE	PACKAGING
STN5PF20V	N5PF20V	SOT-223	TAPE & REEL

STN5PF20V

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage ($V_{GS} = 0$)	20	V
V_{DGR}	Drain-gate Voltage ($R_{GS} = 20\text{ k}\Omega$)	20	V
V_{GS}	Gate- source Voltage	± 8	V
I_D	Drain Current (continuous) at $T_C = 25^\circ\text{C}$	5	A
I_D	Drain Current (continuous) at $T_C = 100^\circ\text{C}$	3.1	A
$I_{DM}(\bullet)$	Drain Current (pulsed)	20	A
P_{TOT}	Total Dissipation at $T_C = 25^\circ\text{C}$	2.5	W

(\bullet) Pulse width limited by safe operating area

Note: For the P-CHANNEL MOSFET actual polarity of voltages and current has to be reversed

THERMAL DATA

$R_{thj-pcb}(\ast)$	Thermal Resistance Junction-Pc BoardMax	62.5	$^\circ\text{C/W}$
$R_{thj-amb}$	Thermal Resistance Junction-ambient Max	90	$^\circ\text{C/W}$
T_j	Max. Operating Junction Temperature	-55 to 150	$^\circ\text{C}$
T_{stg}	Storage Temperature	-55 to 150	$^\circ\text{C}$

(\ast) When mounted on FR-4 board of 1inch² pad, 0.5oz Cu

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 250\text{ }\mu\text{A}$, $V_{GS} = 0$	20			V
I_{DSS}	Zero Gate Voltage Drain Current ($V_{GS} = 0$)	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating}$, $T_C = 125^\circ\text{C}$			1 10	μA μA
I_{GSS}	Gate-body Leakage Current ($V_{DS} = 0$)	$V_{GS} = \pm 8\text{V}$			± 100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	0.45			V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 4.5\text{V}$, $I_D = 2.5\text{ A}$ $V_{GS} = 2.5\text{V}$, $I_D = 2.5\text{ A}$		0.065 0.085	0.080 0.10	Ω Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs}(1)$	Forward Transconductance	$V_{DS} = 15\text{ V}$, $I_D = 2.5\text{ A}$		6.6		S
C_{iss}	Input Capacitance	$V_{DS} = 15\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$		412		pF
C_{oss}	Output Capacitance			179		pF
C_{rss}	Reverse Transfer Capacitance			42.5		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)**SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 10\text{ V}$, $I_D = 2.5\text{ A}$		11		ns
t_r	Rise Time	$R_G = 4.7\Omega$, $V_{GS} = 2.5\text{ V}$ (see test circuit, Figure 1)		47		ns
Q_g	Total Gate Charge	$V_{DD} = 10\text{ V}$, $I_D = 5\text{ A}$,		4.5	6	nC
Q_{gs}	Gate-Source Charge	$V_{GS} = 2.5\text{ V}$		0.73		nC
Q_{gd}	Gate-Drain Charge	(see test circuit, Figure 2)		1.75		nC

SWITCHING OFF

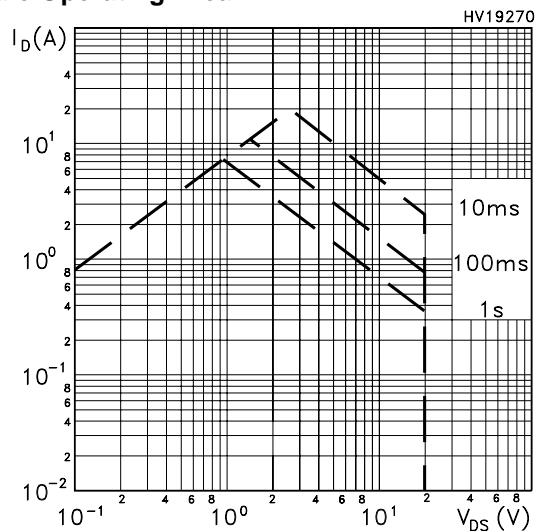
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off-Delay Time	$V_{DD} = 10\text{ V}$, $I_D = 2.5\text{ A}$,		39		ns
t_f	Fall Time	$R_G = 4.7\Omega$, $V_{GS} = 2.5\text{ V}$ (see test circuit, Figure 1)		20		ns

SOURCE DRAIN DIODE

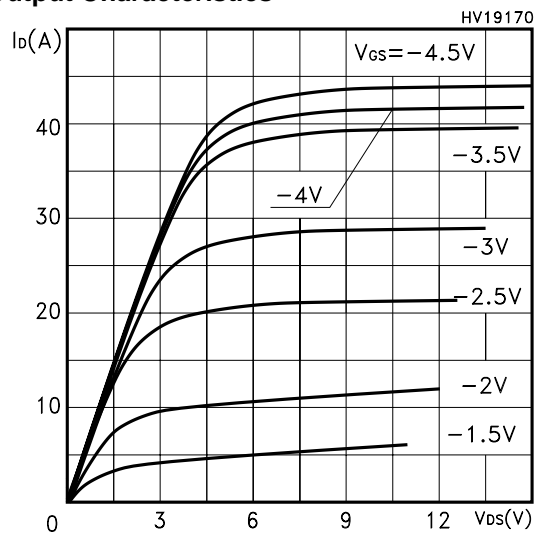
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				5	A
I_{SDM}	Source-drain Current (pulsed)				20	A
$V_{SD(1)}$	Forward On Voltage	$I_{SD} = 5\text{ A}$, $V_{GS} = 0$			1.2	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 5\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$,		32		ns
Q_{rr}	Reverse Recovery Charge	$V_{DD} = 16\text{ V}$, $T_j = 150^\circ\text{C}$		12.8		nC
I_{RRM}	Reverse Recovery Current	(see test circuit, Figure 3)		0.8		A

Note: 1. Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.

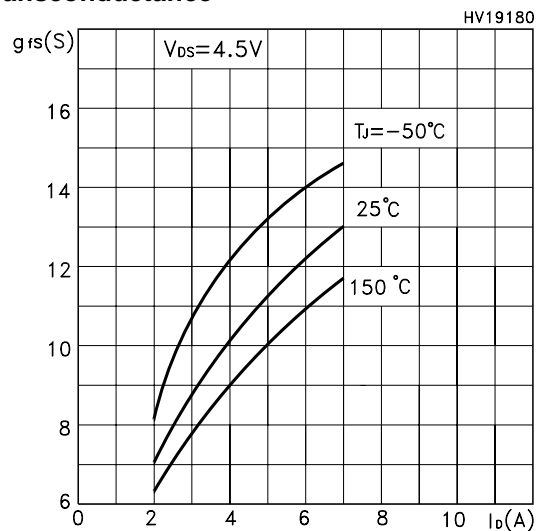
Safe Operating Area



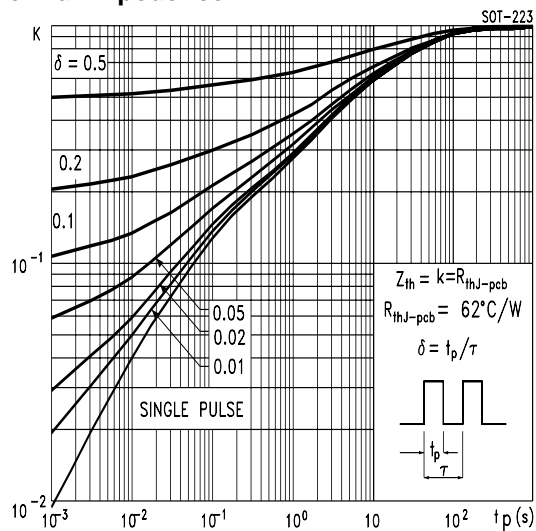
Output Characteristics



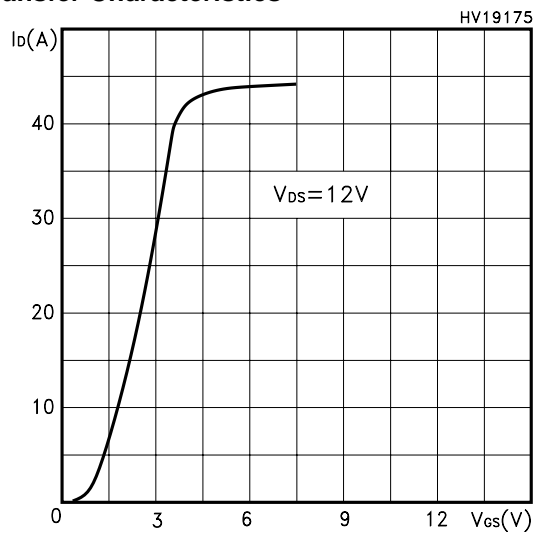
Transconductance



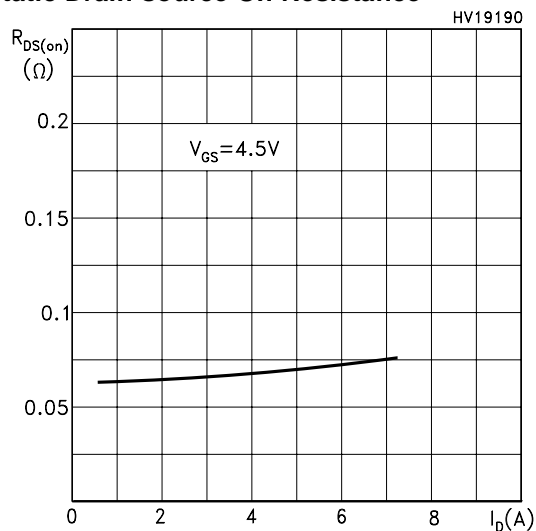
Thermal Impedance



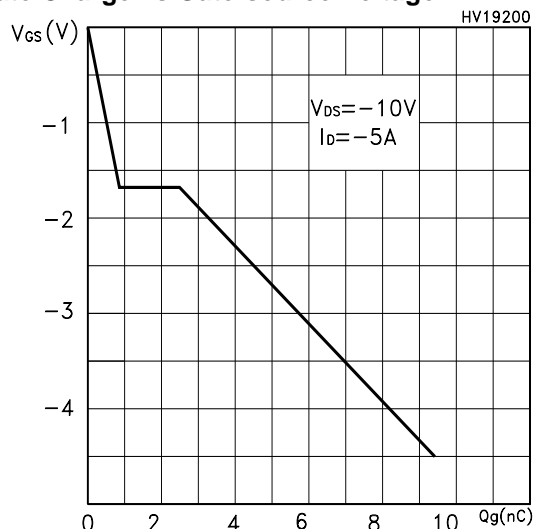
Transfer Characteristics



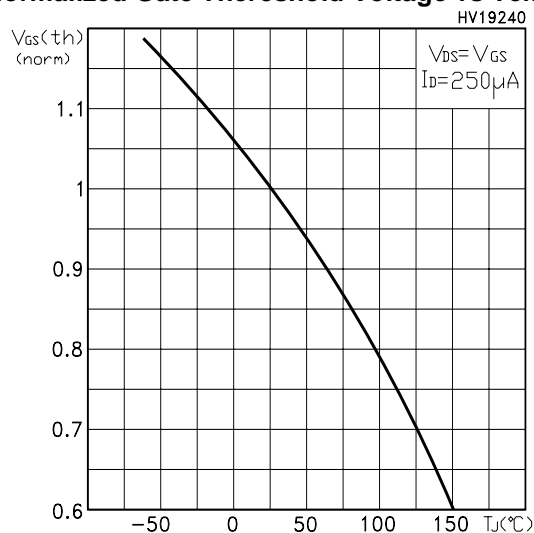
Static Drain-source On Resistance



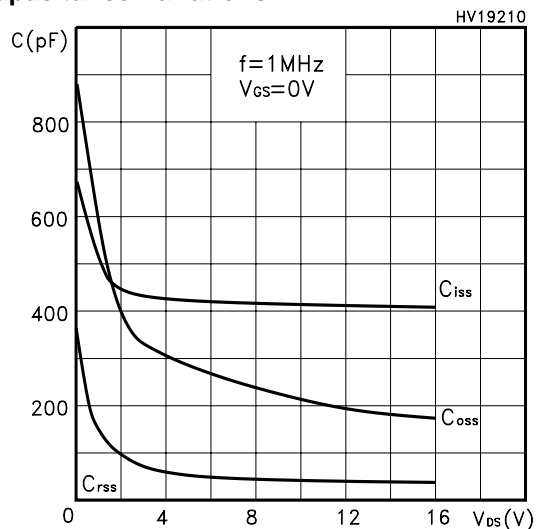
Gate Charge vs Gate-source Voltage



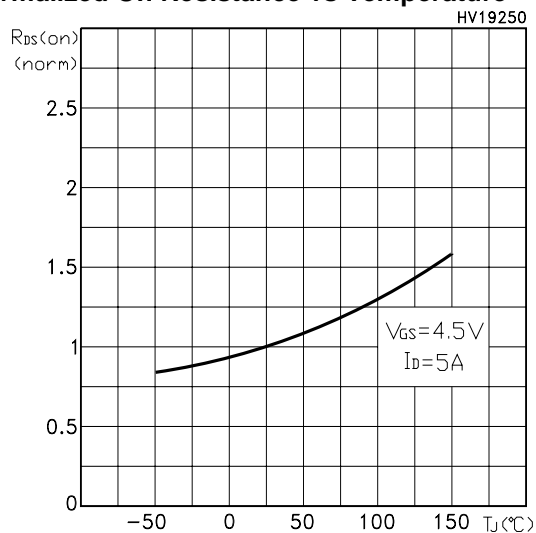
Normalized Gate Threshold Voltage vs Temp.



Capacitance Variations



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics

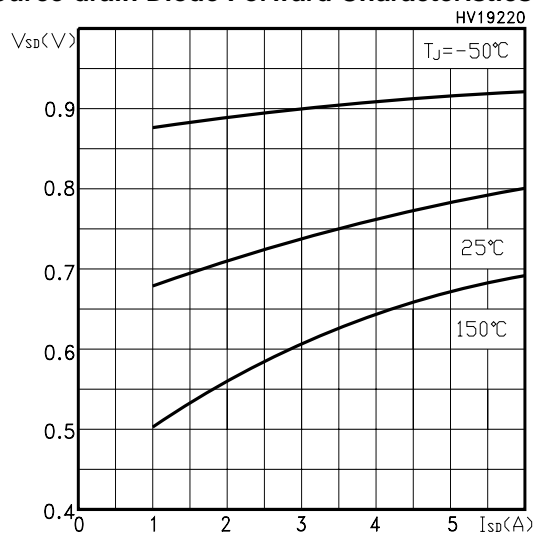


Fig. 1: Switching Times Test Circuit For Resistive Load

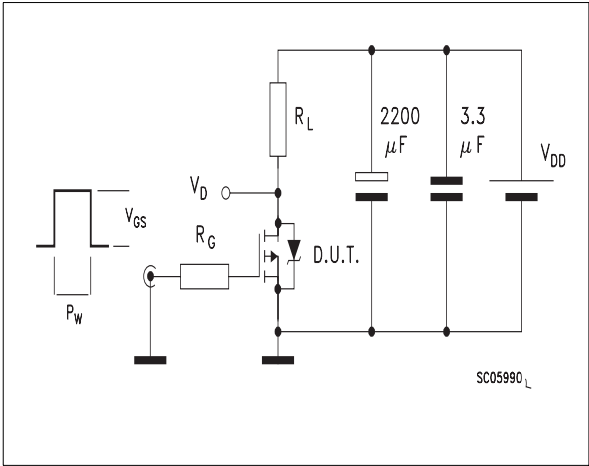


Fig. 2: Gate Charge test Circuit

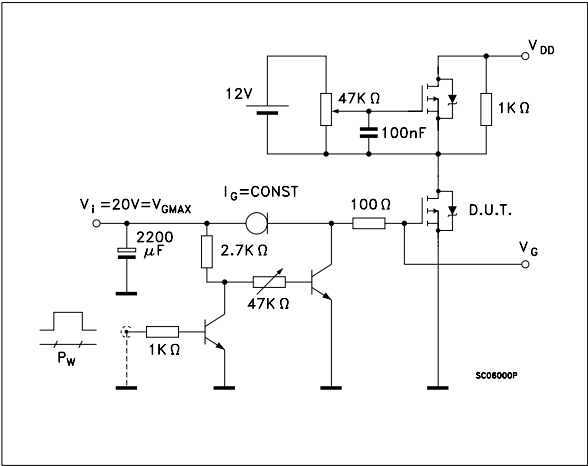
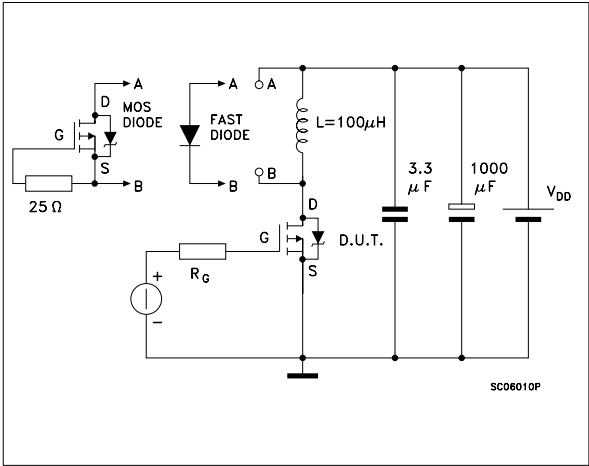
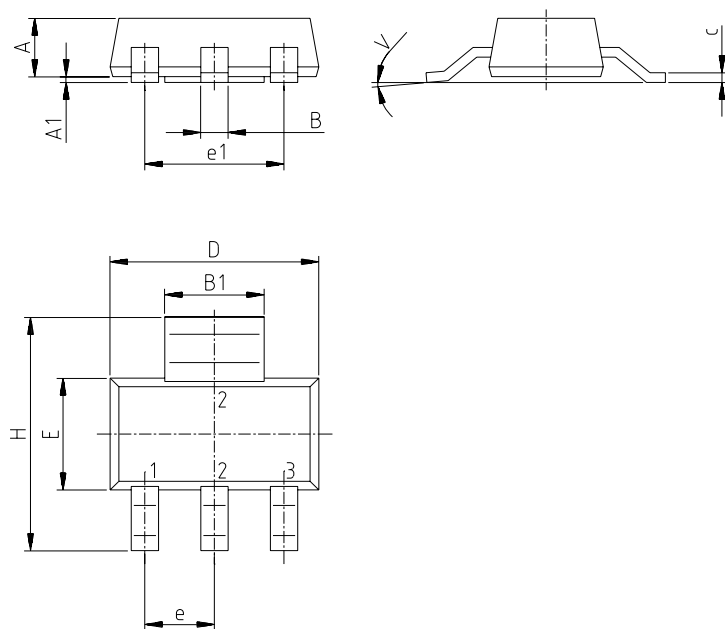


Fig. 3: Test Circuit For Diode Recovery Behaviour



SOT-223 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.80			0.071
B	0.60	0.70	0.80	0.024	0.027	0.031
B1	2.90	3.00	3.10	0.114	0.118	0.122
c	0.24	0.26	0.32	0.009	0.010	0.013
D	6.30	6.50	6.70	0.248	0.256	0.264
e		2.30			0.090	
e1		4.60			0.181	
E	3.30	3.50	3.70	0.130	0.138	0.146
H	6.70	7.00	7.30	0.264	0.276	0.287
V			10°			10°
A1		0.02				



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